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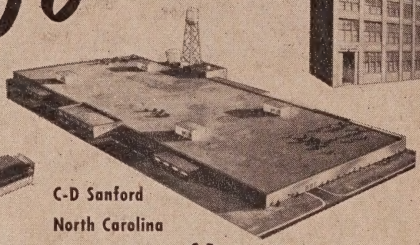

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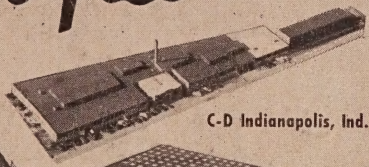

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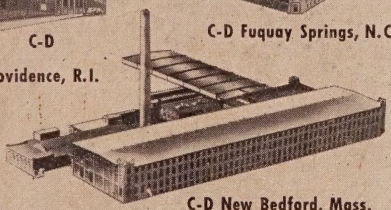

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Vol. 19 OCTOBER, 1954 No. 10

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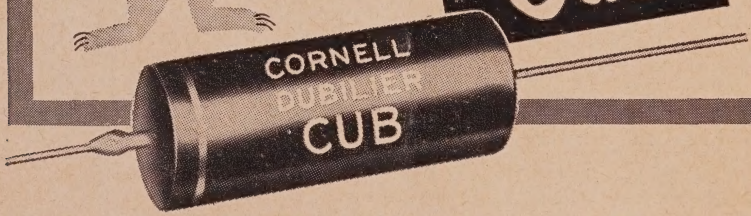

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TRANSISTORIZED AMATEUR FIELD STRENGTH METER

Battery-operated test instruments long have been attractive in electronics because they offer the complete isolation so often desirable in such equipment. They also are readily portable and thus suited to field use. The main reason why they are not used more often is their need for frequent battery replacement, a requirement which can become a nuisance outweighing any advantages.

The transistor is causing new attention to be focused upon battery-operated equipment. The junction transistor is a low-current-drain device affording long battery life. Indeed, the designers of certain transistorized equipment have not bothered to include an ON-OFF switch, since the batteries give fairly long life in these gadgets even if they are left running continuously!

Commercial transistors are not yet suitable for every type of electronic instrument. Temperature sensitivity, restricted high-frequency response, noise, and low input impedance are some of the factors which limit present applications. However, there are some uses which can take advantage

Fig. 1. External View of Transistorized Field Strength Meter. The instrument is self-contained in an aluminum box, 7" long, 5" high, and 3" deep. A single flashlight cell furnishes all power required.

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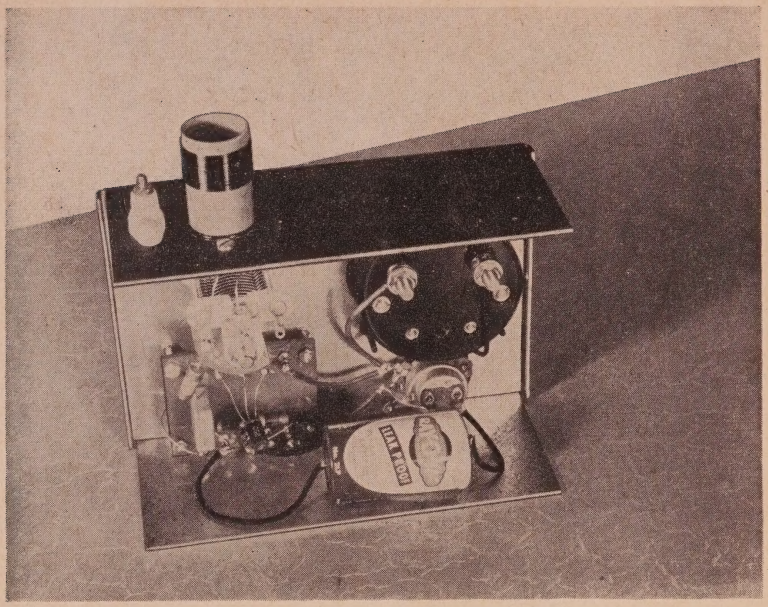


Fig. 2. Internal View of the Field Strength Meter.

immediately of the attractive current amplification factor of transistors. One of these is the amateur field strength meter.

Most amateur field strength meters employ germanium diode detectors which drive 1-milliampere d. c. meters. While simple and readily portable, these instruments usually suffer from poor sensitivity. Satisfactory operation is secured either by operating the transmitter under test at maximum power and interference-producing capability, or using an expensive, delicate d. c. microammeter in the field strength meter. Tube-type field strength meters give better sensitivity but introduce the problem of "A" and "B" battery drain.

The sensitive field strength meter described in this article uses the regular germanium diode detector (signal rectifier). In addition, however, the d. c. output of the diode is fed into a single-stage transistor d. c. amplifier which has enough gain to build up a few microamperes diode output to a full milliampere to drive the rugged 0-1 d. c. milliammeter. Only one battery is required, and this is a 1½-volt flashlight cell.

Operating Principle

The junction transistor affords high current amplification when it is used in the grounded-emitter circuit. A transistor having an alpha of 0.95, for example, will give a current gain of 19 in this circuit.

The field strength meter described here uses a Raytheon type CK721 transistor as the grounded-emitter d. c. amplifier following the diode signal rectifier. This arrangement is shown in the complete circuit, Figure 4. Transistorized microammeters of the

d. c. amplifier type have been described previously in practical articles.[1], [2], [3]

The current gain provided by this amplifier stage will be 25 or higher, depending upon the individual transistor. Thus, a direct current of 40 microamperes from the diode will be multipled 25 times to deflect the 0-1 d. c. milliammeter, M, to full scale. Some transistors will give higher current gain. The author has checked units of the same type as shown here that gave gains of 40, thus producing a 1-milliampere output for a 25-microampere input.

Instrument Circuit

The complete circuit of the field strength meter is shown in Figure 4.

The detector portion of this circuit will be familiar to most amateurs. The plug-in coil, L, is tuned to the operating frequency by means of the variable capacitor, C_1. A metal rod or a length of stiff wire is plugged into the antenna terminal for r. f. pickup. A tap is provided on the coil for the diode circuit, since the latter is low impedance.

A Type 1N56 high-conduction diode is used, in order to obtain maximum d. c. output for a given r. f. input. The diode is connected backward from the common viewpoint. This is necessary to impress a negative d. c. voltage on the base of the transistor, T. A negative input is required for upward deflection of the milliammeter, since a phase reversal occurs in the grounded-emitter circuit.

A particular feature of this circuit is the method of connecting the diode

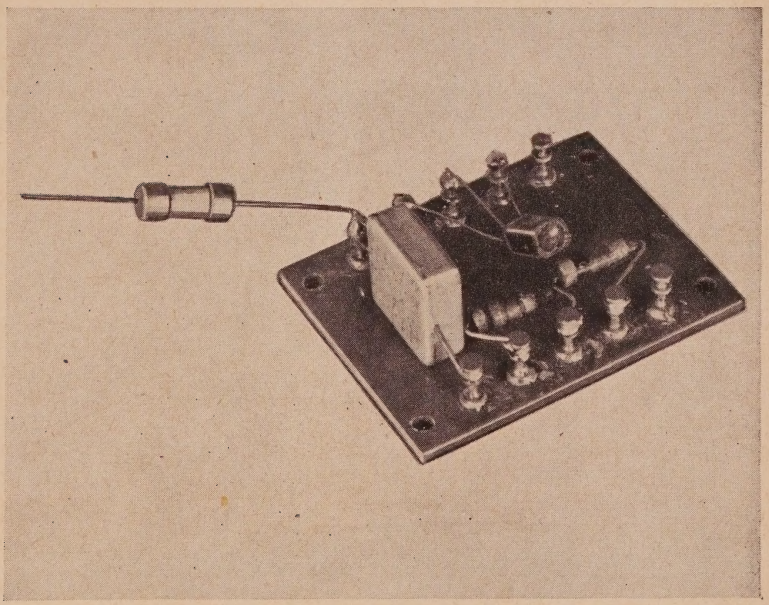


Fig. 3. The Detector-Amplifier Board. Compare with Figure 5 for identification of components.

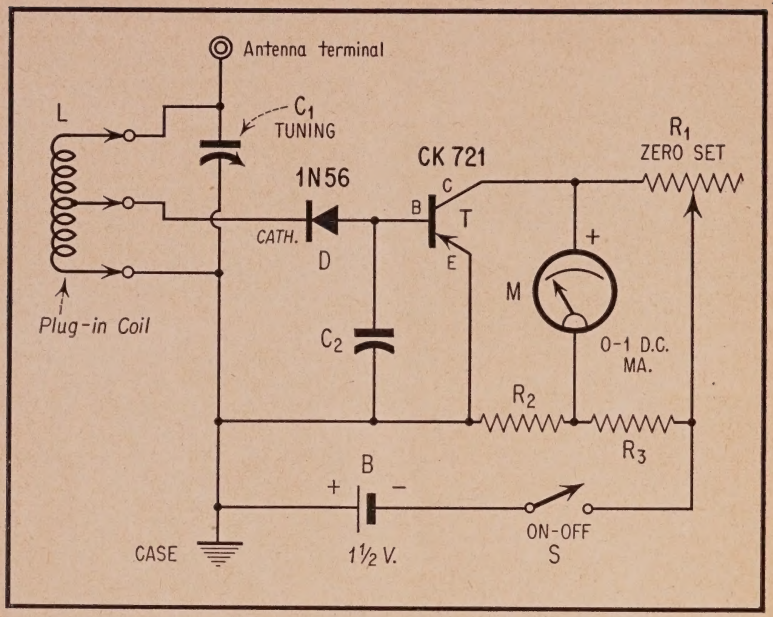


Fig. 4. Complete Circuit of the Transistorized Field Strength Meter.

anode directly to the base electrode of the transistor. This arrangement causes d. c. output current from the diode to flow directly through the base-to-emitter path of the transistor. This removes any need for coupling resistors and avoids losses due to the use of such components.

The 0-1 d. c. milliammeter, M, is connected in a bridge circuit for zero-setting, similar to the plate bridge circuit employed in vacuum-tube voltmeters. The four arms of this bridge are R_1, R_2, R_3, and the collector resistance (r_c) of the transistor.

A single jumbo-size 1½-volt flashlight cell, B, furnishes all d. c. power required by the transistor circuit. A single-pole, single-throw switch, S, which is attached to the zero-set potentiometer, R_1, interrupts the battery circuit when the instrument is shut down. In a vacuum-tube voltmeter, it would be bad practice to attach this switch to the zero-set potentiometer, since the milliammeter would be in danger of being "pinned" when turning this control far enough to throw the switch. In the transistor circuit, however, such severe deflection of the meter never occurs because of the low no-signal collector current.

Four small plug-in coils cover 1.1 to 150 megacycles in the following overlapping ranges: 1.1 - 3.8, 3.7 - 12.5, 12 - 39, and 37 - 150 Mc. This spread includes all amateur bands from 160 to 2 meters.

Construction

Figures 1, 2, 3, 5, and 6 show constructional details. The field strength meter is built into a standard aluminum chassis box (Bender No. 145), 7" long, 5" high, and 3" deep.

Meter M, tuning capacitor C_1, and potentiometer-switch R_1-S are mounted on the front panel. (See Figure 1.) A 4-pin tube socket for receiving the coils, and a small ceramic standoff terminal post for the antenna rod are mounted on the top. A ¼-inch hole under the center of the terminal post allows a lead to be pulled from the terminal screw through the top of the box with good clearance, to insure minimum capacitance to the metal.

The diode (D), capacitor C_2, transistor T, and resistors R_2 and R_3 are mounted on a 2" x 2½" 10-terminal phenolic terminal strip. Figures 3, 5, and 6 show details of this detector-amplifier board. The components are point-to-point connected directly to the terminals, and underboard wiring (see Figure 6) completes the circuit. The finished board is mounted behind the front panel with four 1-inch 6-32 screws. The board may be seen in Figure 2 directly under the tuning capacitor. Heads of two of the mounting screws are visible under the tuning dial in Figure 1.

The transistor pigtails are clipped to ⅜" length and are soldered to terminals 2, 3, and 4 of the board. Make these connections as quickly as possible, and hold each pigtail firmly with a pair of long-nose pliers close to the body of the transistor, in order

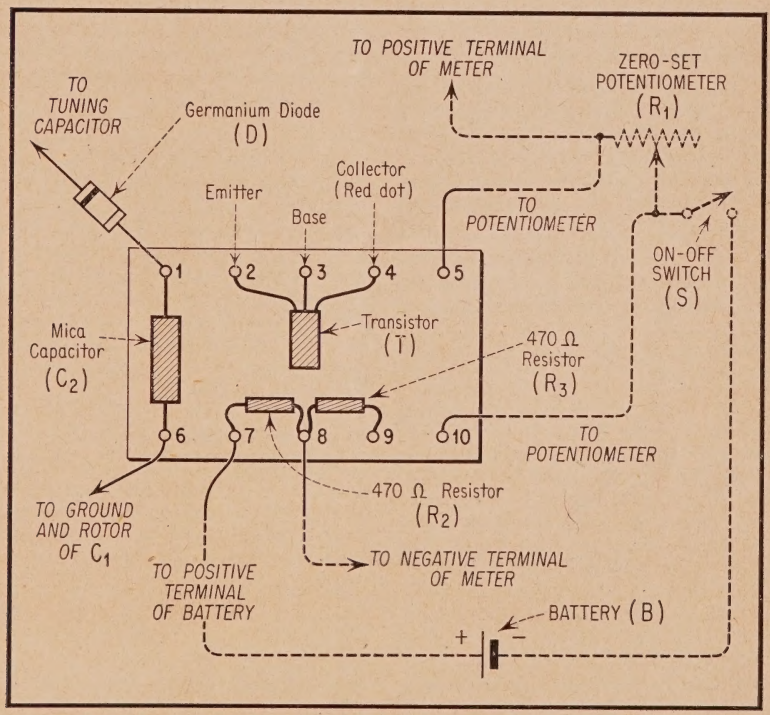


Fig. 5. Top of Detector-Amplifier Board, showing mounted components.

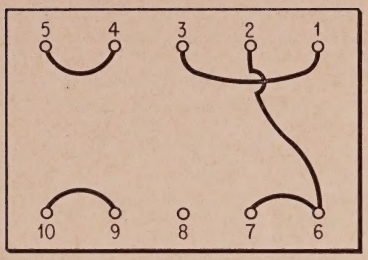


Fig. 6. Bottom of Detector-Amplifier Board, showing under-board wiring between terminals.

to take away the heat of soldering and prevent damage to the transistor. Continue to hold the lead with the pliers until the soldered joint and pigtail are cold. Use the same precaution when soldering the diode into the circuit.

The cell, B, may be held to the base of the box, in the position in which it appears in Figure 2, by means of a semicircular strap of sheet metal or plastic. This strap had not been installed when the photograph was made.

Take care to observe correct connections to base, emitter, and collector terminals of the transistor — and correct polarity of battery B. A mistake either way is apt to result in a burned-out transistor!

The coils are wound on 1-inch-diameter, 4-pin phenolic forms (National Type XR-1). Three pins of each form are used; one for each end of the coil winding and one for the tap. Winding instructions are given in the accompanying Coil Table. The only unconventional coil is that for the highest-frequency. This consists of a U-shaped loop of No. 14 bare copper wire. Cut and form the loop 2 inches long (measured from one tip, around the bend to the other tip) and with a separation of ½ inch between the straight sides of the loop. This separation allows the loop to be slipped easily into the base pins of the coil form and soldered flush. This entire loop-coil is inside the form. It is this highest-frequency coil which appears as a blank form closest to the instrument in Figure 1. The coil shown plugged into the socket in Figures 1 and 2 is the 3.7 - 12.5-Mc. unit.

The 3-inch milliammeter and 3½-inch tuning dial used in our version of this field strength meter account for most of the front-panel space. The meter also takes up a good bit of the space inside the box. No attempt was made to miniaturize the instrument, since the purpose of the transistor in this case was not to reduce size requirements but to lower battery drain. An individual builder can achieve considerable size reduction, if this angle appeals to him, by employing a smaller meter and dial.

Using the Instrument

A coil always should be plugged into the coil socket before switching the instrument ON. The coil completes the external base-to-emitter path of the transistor and will validate the zero setting of the meter. After the coil has been plugged in, make certain that the instrument is out of the neighborhood of any strong r. f. fields. Attach an antenna (a vertical 1- or 2-foot metal rod or stiff wire) to the antenna terminal post.

Now, throw the switch S to its ON position. The meter will read above or below zero by a small amount. Adjust potentiometer R_1 carefully for exact zero setting of the meter.

Place the proper coil in the socket (once you have zeroed the meter, coils can be interchanged without switching the instrument off). Tune to the carrier frequency of the transmitter or other r. f. generator under test, by careful adjustment of the C_1 dial.

At the low r. f. signal levels at which this instrument will give full-scale deflection of the milliammeter, response of the diode detector is not linear but is approximately square law. This means that a change in deflection to ½ an original value (such as might occur when rotating an antenna) does not mean that the input signal voltage has dropped to one-half. Actually, the half-voltage point is at ¼ scale. The lower end of a square law meter scale tends to be crowded. For accurate indications, a voltage calibration should be made for the builder's own instrument. This is accomplished best with an unmodulated r. f. signal generator having a microvolt-calibrated output attenuator.

For the calibration; connect the generator output to the antenna terminal and case-ground of the field strength meter, and tune-in the generator signal. Adjust the generator attenuator carefully for full-scale deflection of the milliammeter in the field strength meter. Next, decrease the generator output voltage in as many steps as practicable, plotting the microvolts generator output against the milliammeter readings. From these data, a chart may be prepared or a special card made for the meter.

REFERENCES

1. **Transistor Microammeter,** Nathaniel Rhita, RADIO-ELECTRONICS, June, 1953, p. 49.
2. **The Transistor D. C. Amplifier,** Herbert F. Starke, RADIO AND TELEVISION NEWS, December, 1953, p. 82.
3. **Transistors, Theory and Practice,** (book), Rufus P. Turner, pp. 103-104.

PARTS LIST FOR FIGURE 4

B—1½-volt jumbo-size flashlight cell

C_1—Midget 140 uufd. variable capacitor — Hammarlund MC-140-S

C_2—0.002 ufd. mica

D—High-current germanium diode — Sylvania 1N56

L—Plug-in coil (See Coil Table for winding instructions)

M—0-1 d. c. milliammeter

R_1—10,000-ohm potentiometer, wirewound, with switch

R_2—470 ohms ½ watt carbon

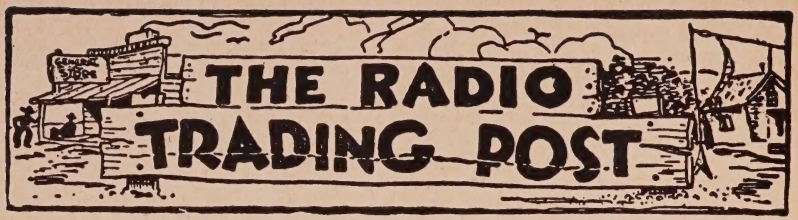
R_3—470 ohms ½ watt carbon

S—S. p. s. t. switch attached to potentiometer R_1

T—High-alpha junction transistor — Raytheon CK721

COIL TABLE

Frequency Coverage	Winding Data
1.1 - 3.8 Mc.	72 turns No. 32 enamelled wire closewound on 1"-diameter form. Tap 14th turn from ground end.
3.7 - 12.5 Mc.	21 turns No. 22 enamelled wire closewound on 1"-diameter form. Tap 5th turn from ground end.
12 - 39 Mc.	6 turns No. 22 enamelled wire on 1"-diameter form. Space to winding length of 7/16 inch. Tap 2nd turn from ground end.
37 - 150 Mc.	U-shaped loop of No. 14 bare copper wire, 2 inches long from tip to tip. ½-inch spacing between straight sides of U loop. Tap at center of loop bend.



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FOR SALE — GE oscilloscope V3856, $37; Dumont Oscillograph 175-A, $37; Walkie-Talkie Rauland Co. Signal Corps., BC-322 (52-65 Mc.), $35; Hickok tube tester, dynamic mutual conductance model 530, $26; Ditto Duplicator, model D-44, $40. All fair cond. S. Krzak, 65 Main St., Pawtucket, R. I.

WANTED — Capacitor Analyzer, factory wired unit only. Give manufacturers name, model number, range, cond., and lowest delivered price. D. Kurs, 321 Fairmount Ave., Jersey City 6, N. J.

SELL OR SWAP — BC-348K unmodified. Want short wave diathermy or medical equipment — 20-10 meter beam and components; recording galvanometer. L. Meister, 5 Highfield Lane, Nutley, N. J.

FOR SALE — DeForest's complete Radio-TV master correspondence course, with all kits and lessons to make over 300 experiments, l. n., $125. A. Atlas, Levis, Quebec, Canada.

WANTED — Used Pilotuner in good cond., model T-601, will pay postage from anywhere in U. S. M. E. Stevens, c-o Newark Caster and Truck Corp., 396 W. Market St., Newark 7, N. J.

FOR SALE — IRE Proceedings, 1949 thru 1953. Best offer. J. A. Schindler, 38 Walnut Park, Boston 19, Mass.

FOR SALE — Harvey-Wells bandmaster senior, TBS-50, with push-to-talk relay; Gonset Super 6 converter with model B noise clipper, exc. cond., 150. S. R. Kupfer, 1 Nevins St., Brooklyn 17, N. Y.

FOR SALE — American Beauty auto. soldering iron stand, $2; General Radio, type 301, 200-ohm, potentiometer, $1.50; Astatic, E4P tone equalizer, $1.25; Rider automatic record changer manual, 1941, $5. Curtis Radio Service, Enterprise, Ore.

TRADE — Model 97 12-gauge Winchester pump shotgun, guaranteed like new, for radio test instruments. R. E. Jones, Meadow Creek, W. Va.

FOR SALE — Old type radio receivers: Federal 61 and type F, and 2 type D Ortho-eonic; West. Elec. 10D loud speaking Telephone outfit for use with type 61 set; National Home Power unit; Pathe speaker; socket power A B; Todd battery eliminator, type B. Make offer. Robert H. Stretton, 1 Sherman Rd., Farmingdale L. I.

AUDIO ENGINEERING magazine of Dec., 1948; Feb. and March, 1949; and Jan., 1952, needed to complete library collection. I. O. Ebert, Electrical Engineering Dept., Michigan State College, East Lansing, Mich.

WANTED — Good overhead type disc recording lathe, such as the Rek-O-Kut M-12, or similar. Either with or without cutting head. Give full details. John T. Moore, Box 63, Seneca, S. C.

SELL — Hallicrafters S76 with spkr., 2 RCA 809's, Masco amplifier, 3 12" speakers, Turner U9S mike, Bliley 100 Kc. crystal, 3" panel meters. John V. Urban, 140 - 34 Holly Ave., Flushing, N. Y.

WANTED — 3 to 5 Kw. 110 v. 60 cycle power plant in good cond. Will buy or trade many valuable items, send for list. Lew Jones, 325 W. Philadelphia St., York, Pa.

FOR SALE — ICS radio and TV correspondence course in hard back covers, exc. cond., best offer over $20; also ICS Accounting course, $15. Arthur Ideker, 1505 West 14th Ave., Pine Bluff, Ark.

FOR SALE — Intercomm., multi-station master, light walnut modern cabinet, six pushbutton station selector keys, like RCA Victor model MI-6373, $25 FOB. L. Buddine, 1700 W. High St., Haddon Heights, N. J.

POSITION WANTED — Factory licensed radio and TV serviceman wants change in position. Can furnish tools, instruments and car. J. C. Klopping, 30 East Border Drive, Spring Hill, Ala.

TRADE — 522 receiver, converted to 2 M operation, plus power supply; partially completed 75 w. speech amplifier and modulator, for cheap comm. receiver. Jack Margolis, 721 N. Fuller, Los Angeles 46, Calif.

SELL OR SWAP — ATR inverter, 6 v. DC to 110 v. AC @ 85 w., model RSD; 7JP4 picture tube; APN-1 Wobbulator; Superior AM sig. gen., model 1130S. Boddie Radio & TV, 9410 Pierpont Ave., Cleveland 8, Ohio.

FOR SALE — Pierce wire recorder, like new, high and low level inputs, jack for remote control, public address also, one hour reel included. Cost $400, want $75 or best offer. Edward Lind, 686 Georgia Ave., Brooklyn 7, N. Y.

FOR SALE — Riders manuals 7 thru 11 and National correspondence course, 85 lessons. Make offer. S. A. Gornick, 1150 North LaSalle St., Chicago 10, Ill.

FOR SALE — Eico 20,000 ohm-volt multimeter, factory wired, year guarantee, $22.95; Pet hi-power 1/4" electric drill, year guarantee, $8.95; Echophone Commercial comm. receiver, BFO and spkr., .5 to 32 Mc., $24.95. F. McCabe, 117 Gordon St., Clifton, N. J.

WANTED — Type 1022-A FM Standard sig. gen., new or used. Offer and price to: Werk, 3039 Lincoln Ave., Chicago 13, Ill.

WANTED — Top-quality 16 mm. S.O.F. projector. Swap tubes, gear, books, or cash. Ed Howell, Lumberton, N. C.

FOR SALE — 300 w. fone transmitter with VFO, well built in small enclosed steel rack, $200. Consider break up. Send for description and list of ham parts. E. C. Stevens, DeRuyter, N. Y

SWAP — FT-243, or equivalent, 40 meter crystals for same in 80 meter crystals from 3500 Kc. to 3750 Kc. E. W. Hill, Apt B, 6114 Locust St., Philadelphia 39, Pa.

SELL OR SWAP — Stancor 10 meter transmitter ST-203-A and GE dynamotor 6 v. input, 350 v. @ 275 Ma. output, perf. cond.; also GE PR-1 light meter with case. Want Comm. course, with or without kits, NRI or CREI preferred. Eddie W. Lemoine, Box 54, Moreauville, La.

FOR SALE — Used Alliance antenna rotor, model ATR-2 with control box and 100 ft. of connecting wire, $15. Paul Szabo, 650 59th St., Brooklyn 20, N. Y.

FOR SALE — NRI tester, ready to operate $7.50; Radio's Master, 18th Ed., clean copy $3.00. Include postage. Vincent Malack, 10530 Edbrooke Ave., Chicago 28, Ill.

SELL OR TRADE — Good RCA theatre speakers, for system PG-139; MI-9485, -9457A, 1443, 1444, and 2 XT-3083; also spare cones and set plugs. Buyer pick up or pay freight crating. Wiggins Elec., Sedan, Kan.

FOR SALE — Rotary converter, 115 v. DC to 110 v. AC, 160 w., filtered for radio work. Want a 78 RPM disc recorder. Burcher's Electrical Store, 513 Main St., Honesdale, Pa.

FOR SALE — NRI course in Practical Radio, 113 manuals and reference books, without kits, $12.50; CREI Practical Radio Engineering course, lessons 1-20; and Avanced Practical Radio Engineering course, lessons 1-14, 6 blue leatherette binders, $17.50. Herman Bartlett, 92 Birch Ave., Little Silver, N. J.

FOR SALE — Blonder-Tongue DA8-1-M8 set distribution amplifier, $35; 2 Electro-Voice 3010 Tenna Top Boosters, $25 ea. All like new. R. L. Chang, 1424 South Calhoun St., Ft. Wayne, Ind.

FOR SALE — Radio-electronics correspondence course by National Schools of LA. Nice cond., in leatherette binders, $25 postpaid. Have other books, magazines, parts, etc., for sale. Mildred Howell, Box 126, Lumberton, N. C.

WANTED — Freq. meter BC-221 with calibration book and crystal. State cond. and price. Richard J. OBrien, Box 84, Babson Park 57, Mass.

FOR SALE — Folders 1 to 115 in 12 vols. of Sams Fotofact. Make offer. Richard Kramer, Box 384, Stevensville, Mich.

FOR SALE — Have 2 CRT 3" and 50° Deflection yoke and Flyback transformer, never used. Make cash offer. Satisfaction guaranteed S. J. Lo Nigro, 52 Willowdale Ave., Montclair, N. J.

FOR SALE — Heathkit sweep gen., TS-2, $25; sig. gen., SG-6, $15; Skyscope 3" reflector astronomical telescope with tripod, $21. All exc. cond., and FOB. Robert Ray, 4108 4th Street NW, Canton 8, Ohio.

SWAP — 10HP4 and cash, for comm. receiver, or tape recorder, or 4" x 5" camera. Paul Merriman, 10647 Mather Ave., Sunland, Calif.

SELL OR TRADE — Precise 300 scope in perf. cond., $90; or swap for Collins 70E-8A or similar VFO, or what have you? David Dillon, 1253 Fennimore St., Fairmont, W. Va.

WANTED — Will buy transmitting, special purpose, subminiatures, and receiving tubes. Interested in all types including some obsolete kinds. B. N. Gensler, 136 Liberty St., New York 6, N. Y.

FOR SALE — Webster model 80-1 wire recorder, exc. shape, $45. Send deposit for COD shipment. G. D. Griffin, 1359 39th Ave., San Francisco 22, Calif.

WANTED — Precision dial mechanism, with or without condenser, similar to that in BC-221 freq. meter, powerstat up to 2 KW, toroid or cup coil forms. Have Webster 78 changer to swap or sell. Marc Molyneux, Jr., 8637 9th Court So., Birmingham 6, Ala.

FOR SALE — To local buyer: Superior TV bar gen., 1. n., $30; RCA voltohmyst VTVM, 1. n., $30; or will trade either for 7" portable TV in good working order. George Dalamango, 160 - 26 26th Ave., Flushing 58, N. Y.

FOR SALE — Unused 5UP1 scope tube. Want FM tuner for Magnavox radio, model 148B in good cond. Clifford D. Lessig, Riegel Ridge Rd., RD 1, Milford, N. J.

FOR SALE — SX 71 with matching spkr., $160; Millen GDO with all coils, $40. All in perfect cond. Burton Easton, 85 North Cottage St., Valley Stream, N. Y.

FOR SALE — Sams Photofact folders 1 thru 200 in 20 vols. and Riders TV manuals vols. 1 thru 8. Both sets like new. Best offer takes them. Have test equip.., send for list. Century Electronics, 211-04 99th Ave., Queens Village 29, N. Y.

FOR SALE — Two working TV sets and two needing repairs, cheap; Eico deluxe factory wired sig. gen., 1. n., $35; Heathkit FM tuner, cabinet, 2-stage amp., spkr., $20. Charles E. Spitz, 1420 South Randolph, Arlington 4, Va.

FOR SALE — National NC-108 table model FM receiver/tuner, exc. cond., with tuning meter, high quality output trans. and ext. spkr., SW added, $50 FOB. C. S. Stringfellow, 2233 Acacia Drive, Wilmington, N. C.

CLOSING SHOP — Heathkit: scope 0-8 modified to 0-9, $53; sig. gen., SG-8, $16; tube checker TC2 modified to TC3, $28; battery eliminator BE3, $26. Eico VTVM $20, etc. All FOB. Send self-addressed and stamped envelope. John's Radio & TV Labs, 199 Olive Avenue, Pompton Lakes, N. J.

FOR SALE — Perf. Jackson CRO-2 scope in orig. carton, $150; 15 w. Masco amp., 8" spkr., and crystal mike, $25; 3 Weston Sensitrol relays, $15; also have multimeters and resistors. O. Hergenhan, 503 South 15th St., Newark 3, N. J.

WANTED TO BUY — 10" and 12" TV sets in fair cond. Ed's Radio & TV, Third and LaDalle, Dell Rapids, S. D.

WANTED — University model 4401 Tweeter or equiv. Paul F. Bahr, 1013 Indiana St. SE, Albuquerque, N. M.

SELL OR TRADE — Hi-Fi amp. for phono and mike $14.95; 3 band radio (needs tuning) $9.50; Voigslander 2½" x 3½" cut film camera and film holders $10; G-I recorder-phono assembly $12.95. Y. Brevda, 55 Hanson Pl., Brooklyn 17, N. Y.

FOR SALE — ATD Xmtr. 100 w. 814 final remote control, 4 channels, LF to 18 Mc. phone and CW or tone modulated, l. n., instruction manual, plugs and control box. VFO controlled. Seymour Harris, 758 Princeton Rd., Franklin Sq., L. I., N. Y.

WANTED — Hallicrafter SX-42 receiver in good cond. for cash. Have for trade: Pilot AF-605 FM-AM tuner in original carton. Walter Bruskiewicz, 1107 North Western Ave., Chicago 22, Ill.

FOR SALE — FM Pilotuner, very fine cond., $15; Lincoln commercial record changer, plays 20 hrs. without repeats, practically new, $190. Robert Kennedy, 3942 Natural Bridge, St. Louis 7, Mo.

SELL OR TRADE — Have 16" Tele-King table model M-616 TV receiver in good working cond. Can use 6-12 battery eliminator or what have you? Raymond McKay, Route 3, Box 32, Royal Oak, Mich.

FOR SALE — Mallory VibroPack, VP552, 6 v. input, 250 v. output, $5; l. n. 0-10 Ma. 2" square meters Triplett $3.50 ea.; Eico 425 scope, $28; Shure Xtal and American Dynamic mike and stand, $7. W2ASI, 144 - 34 72 Drive., Flushing 67, L. I., N. Y.

SWAP — 7" TV, Eico VTVM, Heathkit PS2, magnetic recording tape, for Argus C3 or similar 35 mm., tape recorder, or multimeter of Simpson 260 type; also want 36" blade for attic fan. Arnold B. Margolis, 120 - 16 234 Street, Cambria Heights 11, N. Y.

FOR SALE — Factory-made modern limed oak radio-phono-TV cabinet, full doors, 42x42x22, space for 21" TV, record storage space, 3½ cu. ft. speaker baffle, $45 FOB. John Cederstrom, 1303 Winthrop Lane, Rockford, Ill.

FOR SALE — Riders manual Volume VIII, also Supreme Audolyzer model 562, both like new, make offer. Henry B. Tense, 116 Stonehurst Dr., Tenafly, N. J.

SELL OR TRADE — Photographic cameras and projectors; surplus electronic equip., electric motors. Want short-wave rcvr., Marine transceiver or portable short-wave receiver. Wm. Hansen, 165 Silverbrook, Niles, Mich.

FOR SALE — RCA TV model 9T240K, less small tubes; Hallicrafter model 600, complete, less small tubes, each $15 COD. Victor Kozma, 3104 Wilkinson Ave., New York 65, N. Y.

FOR SALE — Sylvania 7" scope $90; 7" TV $20; 813 Final $35; 6 mtr. RF 6J6-832 $15; Harvey-Wells Vibrator supply for TBS-50 $20; Blaupunkt German rcvr., in running cond., $15. Hoppers Radio Shop, 301 Hollis St., Framingham, Mass.

WANTED — Hallicrafters Civic-Patrol rcvr., S-82, FM 30 to 50 Mc., or equiv.; dash control unit (manual) for Firestone Air Chief, stock no. S-7350-2 auto receiver. E. L. Palmer, 1005 Belmont, Tifton, Ga.

WANTED — Police Alarm or similar FM receiver covering approximately 152 to 170 Mc. Will swap heavy duty 600 v. 250 Ma. 6.3 at 4A power supply, or will buy for cash. R. Weakley, 86 Wendell St., Providence, R. I.

SWAP — Xtals, tubes, condensers, fixed and var., Xformers, anemometer, ham gear, want good SW converter, or ?? Oscar Hager, 1310 Howze Ave., El Paso, Texas.

FOR SALE — Web-Cor 210 tape recorder, and Pilot AF605 AM-FM tuner, sold together, $200, plus frt., new cond. Walter Bartell, 1107 North Western Ave., Chicago 22, Ill.

FOR SALE — Complete 2 meter station, (130) FT-241-A crystals, Vol. I NRI Service manual, video handbook, NRI Service course, NRI sig. gen., NRI tube tester, model ADT Xmtr., assorted tubes. Best offer. R. L. Pearson, 139 Riverside Dr., Dedham, Mass.

WANTED — Precision E200C sig. gen.; photographic enlarger; 5x8 Kelsey printing press. Have TV set, test equip., surplus radio gear. Ace TV 5341 Cordelia Ave., Baltimore 15, Md.

WANTED — 21" TV, UHF, VHF, RCA, Arvin, or Westinghouse in A-1 cond. Have 1700 radio tubes in orig. cartons, included are RCA, NU, Kenrad, Sylvania, etc. Will sell for $300 cash or trade for TV. O. D. Fortner, 58 N. Main St., Canton, Ill.

FOR SALE — Heathkit Vibrator tester, never used, shipped anywhere $10. C. E. Tschiegg, 2307 Evans Drive, Silver Spring, Md.

SELL OR SWAP — Japanese Walkie-Talkie in good cond., for transmitter or complete mobile station, also stamps to trade. Grebe's Radio & Appliance, 518 West Ninth, Loveland, Colo.

SELL OR TRADE — Hickok 288X sig. gen., 1. n., $95; Warner Brush Electroplater, 1. n., $50, with instruction manuals; Sterling radio analyzer, $15 . Paul S. Vasquez, 207 Country Club Rd., New Britain, Conn.

WANTED — Model 476 Mirroscope, A-1 cond. for cash or trade or both. G. E. Howarth, 216 1st Ave. East, Oskaloosa, Iowa.

FOR SALE — Stancor ST203A 10 meter Xmfr., with 6146 final; PE101 Dynamotor, 1. n., both $35. R. Kreisman, 1755 South Robertson Blvd., Los Angeles, Calif.

WANTED — E200C sig. gen., small air conditioner for window, 12" TV. Have Field Strength meter, amplifiers, test equip., and cash. John Arnold, Box 84, Bluffs, Ill.

WANTED — Antenna coil, (slug tuned), for 1951 Ford auto radio, model OCF 018 497. Will take whole coil strip if necessary. J. J. Hitzenhammer, 1319 25th St., Richmond, Calif.

FOR SALE — Riders TV manuals, 1 thru 8, like new, $80. Wm. Klingenbeck, 1685 Hoe Ave., New York 60, N. Y.

FOR SALE — 300 foot RG-59/U, one-piece, 1. n., $12; assorted meters. Park Heights TV Service Co., 216 Slade Ave., Baltimore 8, Md.

TRADE — 25 volumes of encyclopedias in good cond., also stamp collection (over 2000) for 10" TV, portable radio or ?? Ralph Miller, 122 Intervale St., Roxbury 21, Mass.

WANTED — McMurdo Silver Masterpiece VI, 21 tube radio with 18" speaker, any repairable cond. M. Wolff, 1718 Moyer Ave., Elkhart, Ind.

WANTED — To buy or borrow, operating instructions for Hickok Crystal Controlled microvolt generator, model 19XD. Name price or cond. Jacob Zager, 1 Mason St., Hudson, Mass.

FOR SALE — Complete RCP tube and set tester, model 802. J. Lipiner, 1032 Rutland Rd., Brooklyn 12, N. Y.

SELL OR TRADE — Test equip., and surplus radio gear. ROKA, 5341 Cordelia Ave., Baltimore 15, Md.

FOR SALE — Large rectifier power unit, output 250, 80, and 6 v., $25; Precision Elistonometer, series 700, $25; other radio equip. Send for list. Dana Davis, R.R. 4, Unionville, Mo.

SWAP — Two Meissner FM tuners and an Edwards Fidelotuner for ham transmitter or receiver. William Jones, Jr., 13 18th St., Greer, S. C.

SWAP — Pair of Japanese 10x50 "Ranger" binoculars, coated lens, No. 1 cond., for Howard model 490; Super-Skyrider SX-28; NC-200; HQ-120. F. LaFave, 35 Woodland Rd., Wakefield, Mass.

FOR SALE — Nearly new model 200 sig. gen., $9.75; 322 Eico sig. gen., $19.75; model 50 utility tester, never used, $8.50. Send cash or check, and I will pay postage. Ewell Churchill, Cord, Ark.

FOR SALE — Heath TS-3 TV alignment sig. gen.; Heath SG-6 sig. gen.; 3" DeForest scope; complete radio and TV course with experimental lab. parts; "Encyclopedia on Cathode-Ray Oscilloscopes and Their Uses" by Rider. S. Bombka, 2828 W. Melrose St., Chicago 18, Ill.

FOR SALE — Complete set of Sams Photo Facts, 1 to 243, 90 cents a set; Riders manuals 1 to 5 abridged and 6 to 15 in good cond., $8 each for complete set only. C. Schrader, 301 South 18th St., Escanaba, Mich.

FOR SALE — Blonder-Tongue model 99; two Mallory 88 converters, in original boxes; five Hilo UHF aerials; three JFD bow-flector UHF aerials. Make offer. Bud's Radio-TV Service, 5912 Hampton Blvd., St. Louis 9, Mo.

FOR SALE — Cheap, undrilled aluminum rack panels, easily worked. Also RF connectors. Ken Palmer, 112 Lake Ave., Blasdell, N. Y.

FOR SALE — VOM Precision model 85 20,000 ohms/volt in orig. shipping, $30 postpaid; RCA HB-3 Engineering Tube handbooks, three binders, vols. 1 thru 6, $6 postpaid. Milton Kalashian, 2 Congress St., Newburyport, Mass.

WANTED — Hallicrafter S-40 or SX71 receiver. Interested in getting DX stations in the 550-1600 Kc. band; reply only if within 300 miles. John R. Willis, Passaic Ave., Caldwell, N. J.

SWAP — Panoramic model PCA-2, Type T200 and handbook, for "Matchbox." Fred Beneditz, Box 354, Tomahawk, Wis.

FOR SALE — HQ-129X receiver, exc. cond.; VX101 VFO, all bands 20 w.; propeller pitch motor; audio modulator 20 w., etc. Sal Pacca, 104 - 54 46th Ave., Corona, N. Y.

SELL OR SWAP — 1/8 HP split phase motor 110 v. AC, 22X Telescope, '47-'50 Buick radio, AC-DC set with single record player, used 21EP4A pix tube. Need 12LP4 tube, UHF booster, or Eico C-R tester. Karl Nester, Box 76, Van Meter, Pa.

WANTED — Odd sets of Sams Photofact folders. Send list and price wanted. John C. Baxter, 1122 North Geyer Rd., Kirkwood 22, Mo.

FOR SALE — Radio and TV books, mostly 1948 and later. Send stamp for list. Also Aerovox C-checker, l. n., $10. Joseph Wunderlich, 969 East North St., Galesburg, Ill.

FOR SALE — Radio tubes, 35 cents each; Reversible Vibrator, $1.50; Buick Replacement Vibrator, $1.25; Radiart Vibrator, $1.25; fuses and pilot lights; Gernsback manuals, vol. 1 - 4, 75 cents each. Mrs. H. Horne, 919 Wisconsin Ave., North Fond du Lac, Wis.

SWAP — 7" table TV; booster; tubes; for what have you? Send list. Thos. R. Rohland, RD 3, Martinsville, Ind.

SWAP OR SELL — NRI transmitter, complete with tubes and mike, never used, for tape recorder, radio parts, or equip. Edward J. Lee, 211 Fourth St., Fall River, Mass.

SELL — 563 Supreme audio oscillator; ATR battery eliminator, used little; Riders manuals 1-9; Sams 1-18 and 93 various number tubes in orig. cartons. James Lemons, 44 South Knox Ct., Denver 19, Colo.

FOR SALE — Hi-Fi output transformer (Peerless S532A) pri. imp. 3,000 5,000, 4 sec. imp., 20 audio watts, (push-pull), $5. L. Matushefske, 2 Elmont Road, Elmont, L. I.

FOR SALE — McMurdo Silver Vomax $39; Heathkit 0-7 $35.. Alliance Antenna Rotator $16; Riders Vol. 14 $6; RCA Service Notes Vols 1 and 2, both for $7. H. Lejuez, 42 - 21 164th St., Flushing, L. I., N. Y.

FOR SALE — Riders radio manuals, 1 thru 14; Stancor 100 w. CW transmitter kit; McElroy Bug (chrome base). All items like new. Make offer. B. W. Houser, 140 South Franklin St., Allentown, Pa.

FOR SALE — SCR 522 transmitter (CW and voice), receiver, power supply and instruction book. Receiver has Xtal for CW reception. Xmitter and receiver in cabinets, $75. Charles M. Kelly, Jr., 293 Benedict Ave., Tarrytown, N. Y.

FOR SALE — R27/ARC5, 6-9.1 Mc. rcvr., unconverted; and BC-459A, 7-9.1 Mc. transmitter, unconverted, $15 each plus shipping charges. Both with diagrams and conversion data. John J. Lelis, 59-06 Linden St., Brooklyn 27, N. Y.

WANTED — Test equip.: VTVM, scope, etc. (Hickok preferred),tubes, TV and radio parts and service manuals. Sy Salinger, 6556 North Smedley St., Philadelphia 26, Pa.

WANTED — Tuning mechanism for RCA, model 813K, 5 band receiver, also an 8BP4A. State price first letter. John H. Oxrieder, 5018 Elm St., Bethesda 14, Md.

WANTED — Subraco 10 meter mobile. State price and cond. in first letter. G. Whattam, 29 Mount View St., Newton, N. J.

FOR SALE — 10 and 20 meter Kw. Xmtr. using P.P. 250TH's. Final Amp modulated by 805's Class B. UTC Linear Standard audio components, D104 mike, Variac control of input power to final amp. and modulator, $350, prefer local. James B. Mee, 165 Oakland Avenue, Arlington, Mass.

FOR SALE — Hickok 610A gen., and Hickok 191x Microvolt gen., exc. cond. Write for further details and low price. Al's TV, 38 South 21st St., Kenilworth, N. J.

WANTED — Harvey-Wells TBS-50 in any cond., or want cabinet only. Will trade equiv. radio or non-radio items for transmitter or buy cabinet for cash. G. Samkofsky, 527 Bedford Ave., Brooklyn 11, N. Y.

WANTED — Waterman S-10A Pocketscope, priced at $25 each. Ivan R. Damon, 17368 South 68th Ct., Tinley Park, Ill.

FOR SALE — GE AM-FM sig. gen., model YGS-3, 100 Kc to 150 Mc., l. n., $62. Daves Radio, 1316 - 42nd St., Brooklyn 19, N. Y.

TRADE — Clean copies QST from Jan., '47 thru Dec., '53 for tubes, parts, tools, or what have you? E. E. Ellsworth, 245 Fir, Park Forest, Ill.

FOR SALE — Radio and TV courses: $15 for radio, $20 for TV. John Daley, Sergeant Bluff, Iowa.

FOR SALE — Eico scope, model 425K, $32; General Radio wave filter, 500 cycles, $17.50 ea., both high-pass and low-pass; General Radio Rheostat, 50,000 ohms, types 371-A and 314-A, $1.25 ea. S. S. Brody, 211 - 10 73rd Ave., Bayside, Queens.

FOR SALE — Collector's Item: Atwater-Kent radio, model 42 with attached E3 speaker, crackle finish, steel cabinet, orig. tubes, perf. cond., looks l. n., best offer. Arnold J. Drewlo, Hugo, Minn.

TRADE — Two 811's, two T40's, two 809's, two 100TH's, one HY75, exc. cond., also meters, filter Xformers, two 500 w. coils for 10 and 20 meters, 3000 v. tuning condensers,etc. Want 807W and 2E26 tubes. Sanford's Electronics, Hillsboro, Wis.

FOR SALE — RCP 668 Cap. and VTVM, all ranges, sells for $107, best offer takes it. Agostino, 223 So. Winebiddle, Ave., Pittsburgh 24, Pa.

FOR SALE — Riders 6, 10, 15, 16, 22; TV Vol. 1; Sams 1, 2, 3; Supreme manual 1 to 10; others. Two Sparton TV sets, TV antennas, steel cabinets of resistors, condensers, tools, test equip., tubes, radios. Frank Kesto, Route 1, North Rose, N. Y.

WANTED — Inverter 12-14 v. DC to 115 v. AC, describe in first letter. Have for sale or trade ATR Inverter 32 v. DC to 115 v. AC 100 w. H. H. Harrison, 300 37th Way, Sacramento, Calif.

FOR SALE — Like new Hi-Fi 15" Alt. Lansg speaker and Leica camera M/3 with tele lens and flash equip. Ernest Mueller, 44 Carlton St., East Orange, N. J.

SWAP — $300 worth of fishing equip., all in exc. cond., for modern TV testing equip., or what have you. Paul Horlander, Star Route, Tell City, Ind.

WANTED — 3KP4 and 7JP4 pix tubes, new or slightly used, no dogs, also used parts or cabinet for Pilot 3" TV set. Westbery Radio Service, 231 West Penn St., Hoopeston, Ill.

FOR SALE — Weston 2½" round meter, bakelite case, model 506, 0-5 v. DC, perf. electrical cond., $4.75 postpaid. L. Weinreb, 151 - 09 34th Ave., Flushing, N. Y.

FOR SALE — University 6201 speaker, $30; Permoflux 8T-8-1 speaker, $7.50, both in perf. cond.; Craftsman RC2 amplifier, exc. cond., $20; Heath Williamson Ultra-linear amplifier, works perfectly, $50. N. W. Tetenman, 2350 East 27th St., Brooklyn 29, N. Y.

SELL OR SWAP — Radio, TV and ballast tubes for others or electric drill, shaver, tube checker, typewriter. 8" pix tube, $6; screen print outfit, $12; Zenith TV electric remote control, $6 for "H" models. Andrews, 740 Maple Street, Bethlehem, Pa.

FOR SALE — Precision 900 tester $25; Precision E200 sig. gen., $30; Rider manuals 1 thru 14, $75, all FOB. Will trade for Retina 11A and accessories plus cash. Stanley Gale, 223 - 54th St., Brooklyn 20, N. Y.

SELL OR TRADE — Complete 40 w. amp., operates on 6 DC or 110 AC. Want 16 mm. sound projector. Stanley A. Fiedor, 233 Rector St., Philadelphia 28, Pa.

FOR SALE — Webster 78 RPM record player, for 10 and 12" records, automatic record changer with GE reluctance pickup, audio amplifier containing pre-amplifier, also 10" speaker. Make offer. J. Siderman, 41 Obre Pl., Red Bank, N. J.

SWAP — NRI Electronic multitester with all probes in top shape for a 4 or 4½" 0-500 microanometer, Simpson or Triplett preferred, or trade for tube tester. T. E. Champion, 669 Swan S., Terre Haute, Ind.

FOR SALE — Heathkit BE-1 6 v. battery eliminator in good cond., instructions, $15; NRI professional volt-ohm-mil-ammeter, model 44, maroon, cover, handle, test leads, batteries, and manual, $19. R. C. Hequet, 795 N. 10th Ave., Kankakee, Ill.

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40% sharper tuning

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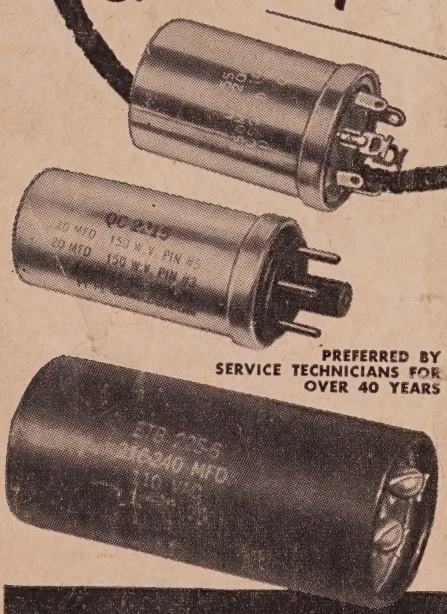

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